SHIFRIN & ASSOCIATES, inc.
Environmental Engineers

June 17, 2009

VIA FEDEX

Ms. Catherine Barrett
SUPR/MOKS
EPA Region VII
901 North 5th Street
Kansas City, Kansas 66101

Re: BLR Redevelopment Corporation
4327 Gustine Avenue
St. Louis, Missouri 63116

Dear Ms. Barrett:

The comments in the May 18, 2009 memorandum from Diane Harris to you, have been incorporated into documents prepared by this office for the above site. These revised documents, signed by Mr. Bussmann, are enclosed for your review and approval and signature:

- Proposed Site Characterization Work Plan. This document has been revised to include the comments included in the referenced memorandum. With respect to the rationale relative to trip blanks, we have eliminated any trip blanks, since it is anticipated that only soil samples will be collected as part of this project.

- Quality Assurance Project Plan ("QAPP"). This document has been revised to incorporate changes to address the items included in the referenced memorandum.

In accordance with our e-mail, we have not included an additional copy of the Health and Safety Plan, which required no revisions. Likewise, the qualifications of the laboratory and drilling sub-contractors, which were previously submitted on a CD, are not being resubmitted.

We assume that signed copies of these documents will be returned to Mr. Bussmann for his file and to this office.

If you have any additional questions and/or comments, please address them to the writer at the address below. We look forward to working with you on this matter.

Z:\WS-FILES\A09014.ltr2.wpd

230 S. Bemiston • Suite 305 • St. Louis, MO 63105 • (314) 721-2249 • FAX 862-0041

Sincerely yours,

Walter G. Shifrin, P.E., President

WGS:mkh
Enclosure

cc: Ms. Julie M. Van Horn w/o enclosures
Mr. Harry T. Bussmann, III

WORK PLAN - SITE CHARACTERIZATION

BLR REDEVELOPMENT CORPORATION
4327 Gustine Avenue
St. Louis, Missouri 63116

April 24, 2009

Prepared for:

BLR Redevelopment Corporation
13400 Lakefront Drive
Earth City, Missouri 63045

Prepared by:

Shifrin & Associates, Inc.
230 S. Bemiston Ave. Suite 305
St. Louis, Missouri 63105

314-721-2249

TITLE AND APPROVAL SHEET

BLR Redevelopment Corporation
4327 Gustine Avenue
St. Louis, Missouri 63116

WORK PLAN - SITE CHARACTERIZATION

(BLR Redevelopment Corporation)

4327 Gustine Avenue, St. Louis, Missouri

April 24, 2009

Catherine Barrett — 6-24-09

Catherine Garrett — Date

USEPA Region VII

H. Bussmann III — 6/15/09

Harry T. Bussmann, III — Date

BLR Redevelopment Corporation

Walter G. Shifrin — 6.15.09

Walter G. Shifrin, P.E., Project Manager — Date

Shifrin & Associates, Inc.

1. INTRODUCTION

This site characterization work plan has been prepared for the BLR Redevelopment Corporation ("BLR") for a portion of the site known as 4327 Gustine Avenue, St. Louis, Missouri 63116. The site is located southwest of the intersection of Gustine and Bingham Avenues. The geographic coordinates of the portion of the site under consideration are 38° 35' 02.67" North and 90° 15' 25.4" West. The approximate location of the site is shown on Figure 1.

2. SITE BACKGROUND INFORMATION

A portion (southwest corner) of the subject site is reported to be part of the Union Electric - Ray Avenue Site, which is to be addressed by the U. S. Environmental Protection Agency (USEPA) and the named Potential Responsible Parties ("PRPs") or "Respondents". BLR has elected not to participate with the other named PRPs. Brown Shoe Co., the prior owner of the subject property, also is a non-participant.

2.1. Site Description

The 0.7 acre (approximate) site is located, as indicated above, in the southwest portion of the BLR property. The approximate property lines are shown on Figure 2, which is an aerial photograph of the site. The subject property boundaries and its relationship to the entire Ray Avenue Site are shown on Figure 3.

The site is a portion of a warehouse and manufacturing building constructed for Brown Shoe Co. The building on the main property has, in recent years, been solely used for warehousing. The building on the property of concern was a chemical building, which was part of the Brown operations. Underground solvent storage tanks were installed on the west side of the chemical building. These tanks were owned and operated by Brown Shoe Co. The current property owner (BLR) never owned or operated the tanks. Based upon signage on the building, the tanks reportedly were used to store the following solvents:

- Trithane
- Acetone
- MEK
- RS Naphtha (Toluene)

A fuel pump also was observed in the area of the tanks. Therefore, gasoline may have been stored in one (1) or more of these tanks at one time. Further, the exact formulation of trithane is unknown. It is possible that it was a product containing xylenes and methyl ethyl ketone (MEK), a spray acrylic enamel product or a urethane polymer. There is some speculation that it may have been a chlorinated hydrocarbon such as 1,1,1-trichloroethane.

The solvent tanks were closed by removal in 1991 by Shifrin & Associates, Inc. ("Shifrin"). The capacities of these four (4) tanks were two (2) at 5,000-gallons and two (2) at 7,000-

gallons. Confirmation soil samples were obtained from the bottom and sidewalls of the excavation. These samples were analyzed for volatile organic compounds. The highest concentrations of detected chemicals of concern were toluene (30.6 mg/kg) and 1,1,1-trichloroethane (26.2 mg/kg).

Impacted soils were excavated and transported from the site for disposal. Due to the concentrations of volatile organic compounds present, a passive air venting system was installed to remediate the residual volatile organic compounds. The subsurface portion of the system remains in place, however the roof turbine vents and aboveground piping have been destroyed.

Additional soil sampling (borings) and analyses were performed in 1993 and 1994. Based upon the results of these samples, a "no further action" letter for these tanks was issued by the Missouri Department of Natural Resources ("MDNR") dated November 28, 2000. A copy of this letter is attached as Exhibit I.

3. SCOPE OF WORK

The portion of the BLR property included in the Union Electric - Ray Avenue Site was initially the site of a "pitch bay", a large shallow tank used to cool pitch in the coal tar distillation process. Due to the high viscosity of the pitch or coal tar, it is unlikely that releases, if any, significantly impacted on site media, other than surface soils. Subsequently, as discussed above four (4) underground steel solvent storage tanks were installed on this portion of the site for Brown Shoe Co. use. As reported, these tanks were closed by removal in 1991. The excavation for removal of the tanks and surrounding impacted soils was to a depth of about 10-feet. In addition, soil borings in the vicinity of the tanks were advanced to a depth of 15-feet bgs. Groundwater was not encountered in the excavation nor in the borings, with one (1) exception. Therefore, it is proposed that only soil samples be collected for analyses. No groundwater samples will be collected.

3.1 Soil Investigations

The area of the BLR property to the west of the main building is approximately 110-feet in an east-west direction and 180-feet north-south. The former chemical building is situated in this area, approximately 30-feet from the west property line. It is proposed to advance five (5) soil borings; three (3) along the north-south fence line, one (1) to the north of the chemical building to obtain soil samples for laboratory analysis and one (1) near the southeast corner of the chemical building, if access can be gained to this later location. The approximate proposed locations of these borings are shown on Figure 4.

The soil borings will be advance using a Geoprobe®, or equivalent hydraulically powered direct-push machine to advance sampling tools into the subsurface. Soil samples will be obtained by pushing a 4-foot long, 2-inch diameter steel pipe into the ground using the Geoprobe® to a depth of 15-feet below ground surface or to the top of the water table, whichever is less. A clear plastic sampling tube will be placed inside of the pipe. Down-

hole sampling equipment shall be decontaminated by washing with Alconox and water and rinsing with tap water before each use. Continuous soil samples will be removed from each bore hole and examined in the field for odor and/or color, which would be indicative of the presence of petroleum or volatile organic contaminants. The samples also will be field screened for the presence of volatile organic compounds. The screening will be performed by placing a portion of each soil sample into an airtight plastic bag. After the soil is warmed to about 65 to 70° F., the headspace in the bag will be monitored for volatile organic gases by inserting the measuring probe of a photoionization detector ("PID"), with a 10.6 eV lamp, into the air or head space. If LNAPLs or DNAPLs are present in any of the borings, a sample will be collected and submitted to the laboratory, along with the soil samples described below.

Soil samples for laboratory analysis will be collected in accordance with the procedures outlined in the Missouri Department of Natural Resources ("MDNR") 2006 *Departmental Missouri Risk-Based Corrective Action (MRBCA) Technical Guidance.* Samples will be collected using Encore samplers (U. S. Environmental Protection Agency Publication SW-846 Method 5035). Following the MRBCA procedures, a surface soil sample (0 to 3-feet bgs), a vadose zone sample and a sample from the capillary fringe, if present, will be collected. All samples will be placed in laboratory furnished clean glass sample containers in accordance with the following:

ANALYSIS	MATRIX	METHOD	SAMPLE SIZE CONTAINER	PRESERVATIVE	HOLDING TIME (Days)	
					EXTRACTION	ANALYSIS
VOCs	Soil	8260B	5035 Kit	Cool, 4° C, Methanol/TSP	NA	14
SVOCs	Soil	8270C	8 oz/Glass	Cool, 4° C	14	40
PCBs	Soil	8082	8 oz/Glass	Cool, 4° C	14	40
Total Metals	Soil	6010B	8 oz/Glass	Cool, 4° C	NA	180
Total Metals (Hg)	Soil	7470	8 oz/Glass	Cool, 4° C	NA	180

The laboratory will be instructed to furnish these containers with appropriate amounts of preservative. The sample containers will be filled with the soil samples, closed with a lid with a Teflon® seal, labeled and marked with a unique identification number and placed in a pre-chilled, iced cooler for preservation and transport to the laboratory.

The cooler with the soil samples will be transported to the laboratory using a chain of custody protocol. The laboratory will be instructed to analyze the surface soil samples for the following:

- Volatile Organic Compounds using Method 8260B
- Semi-Volatile Organic Compounds using Method 8270C
- Polychlorinated Biphenyls ("PCBs") using Method 8082
- Total Toxic Metals (RCRA) using Methods 6010 and 7470

The subsurface samples (vadose zone and capillary fringe) will be analyzed for the same chemicals of concern, using the same methods, except that they will not be analyzed for PCBs. It is unlikely that PCBs, if present, migrated below the surface soils.

3.2 Report

A report will be prepared presenting a description of the work performed (sample locations, etc.) and the results of the sampling/analyses. These results will be used to determine the extent of contamination, if any, on the site. The results will be compared with Default Target Levels and non-residential Tier 1 Risk-Based Target Levels ("RBTLs") as established by MDNR in MRBCA.

3.3 Sub-Contractors

The sub-contractors listed below are proposed to be employed to complete the work described above. Their qualifications to perform this work are attached as Exhibit II and III (respectively) to the Quality Assurance Project Plan.

Drilling	Roberts Environmental Drilling, Inc. 1107 S. Mulberry Street Millstadt, Illinois 62260 618-476-7334
Laboratory	Teklab, Inc. 5445 Horseshoe Lake Road Collinsville, Illinois 62234 618-344-1004

3.4 Quality Assurance Project Plan

A Quality Assurance Project Plan ("QAPP") for the above activities is attached as Exhibit II.

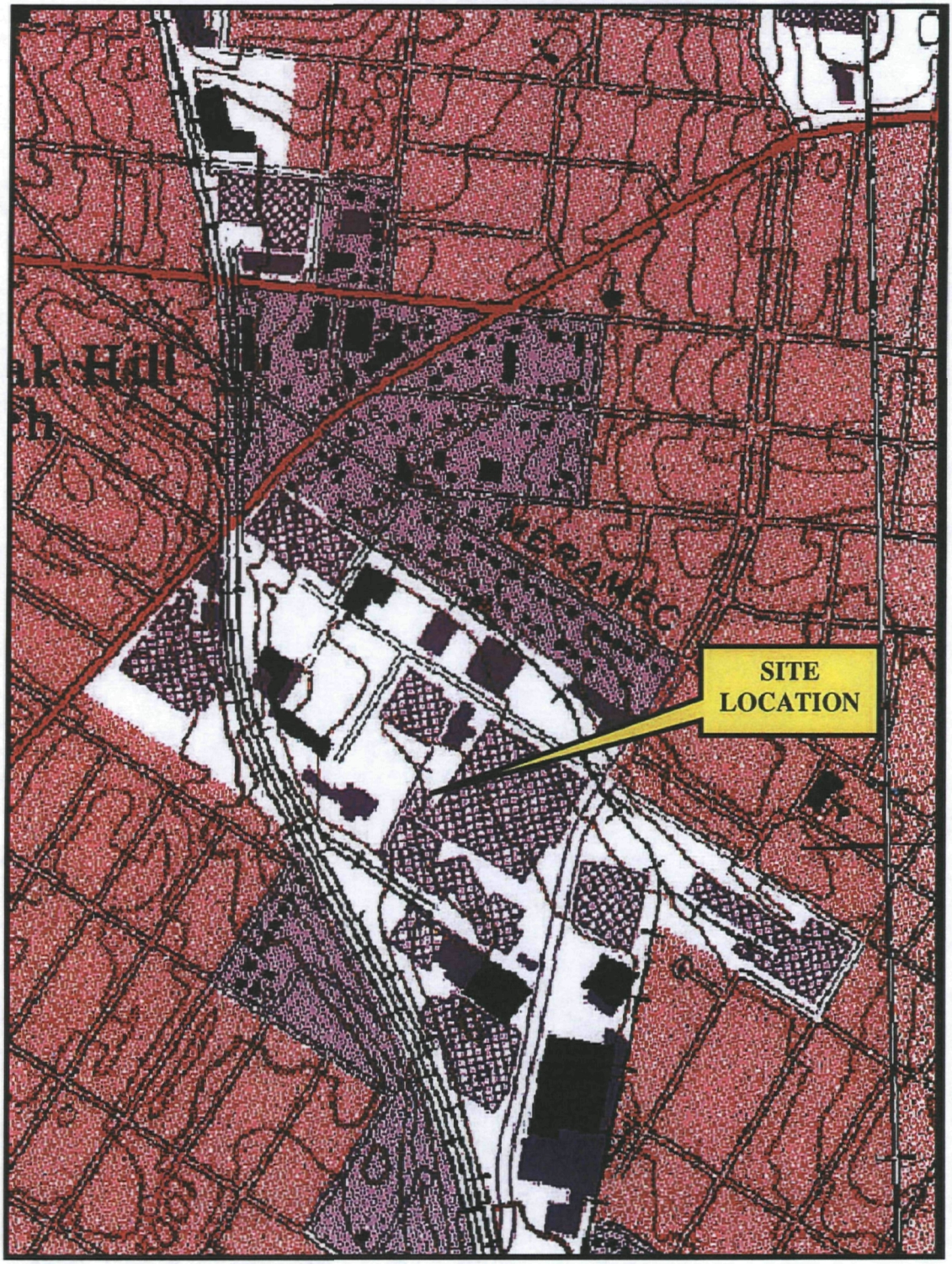
3.5 Health and Safety Plan

A Health and Safety Plan ("HASP") for the work to be performed on the site is attached as Exhibit III.

3.6 Project Schedule

The following schedule will for the Removal Site Evaluation shall be adhered to:

•	Field Work	Within 30 days of approval of this Work Plan
•	Plan Inconsistencies	Notify EPA in writing 7 days following completion of field work
•	Interim Data Submittal	Within 45 days of sampling submit to EPA with location, medium and results
•	Report	Within 45 days of submittal of Interim Data Submittal



SOURCE: USGS QUADRANGLE MAP – TERRASERVER USA

FIGURE 1: SITE LOCATION

DATE: 03-09-09	SHIFRIN & ASSOCIATES, inc. Environmental Engineers 230 S. Bemiston • Suite 305 • St. Louis, MO 63105	4301 GUSTINE AVENUE
SCALE: 1" = 600'		ST. LOUIS, MISSOURI

FIGURE 2: SUBJECT PROPERTY

DATE: 03-02-09	SHIFRIN & ASSOCIATES, inc. Environmental Engineers	4301 GUSTINE AVENUE
SCALE: NOT TO SCALE	230 S. Bemiston • Suite 305 • St. Louis, MO 63105	ST LOUIS, MISSOURI

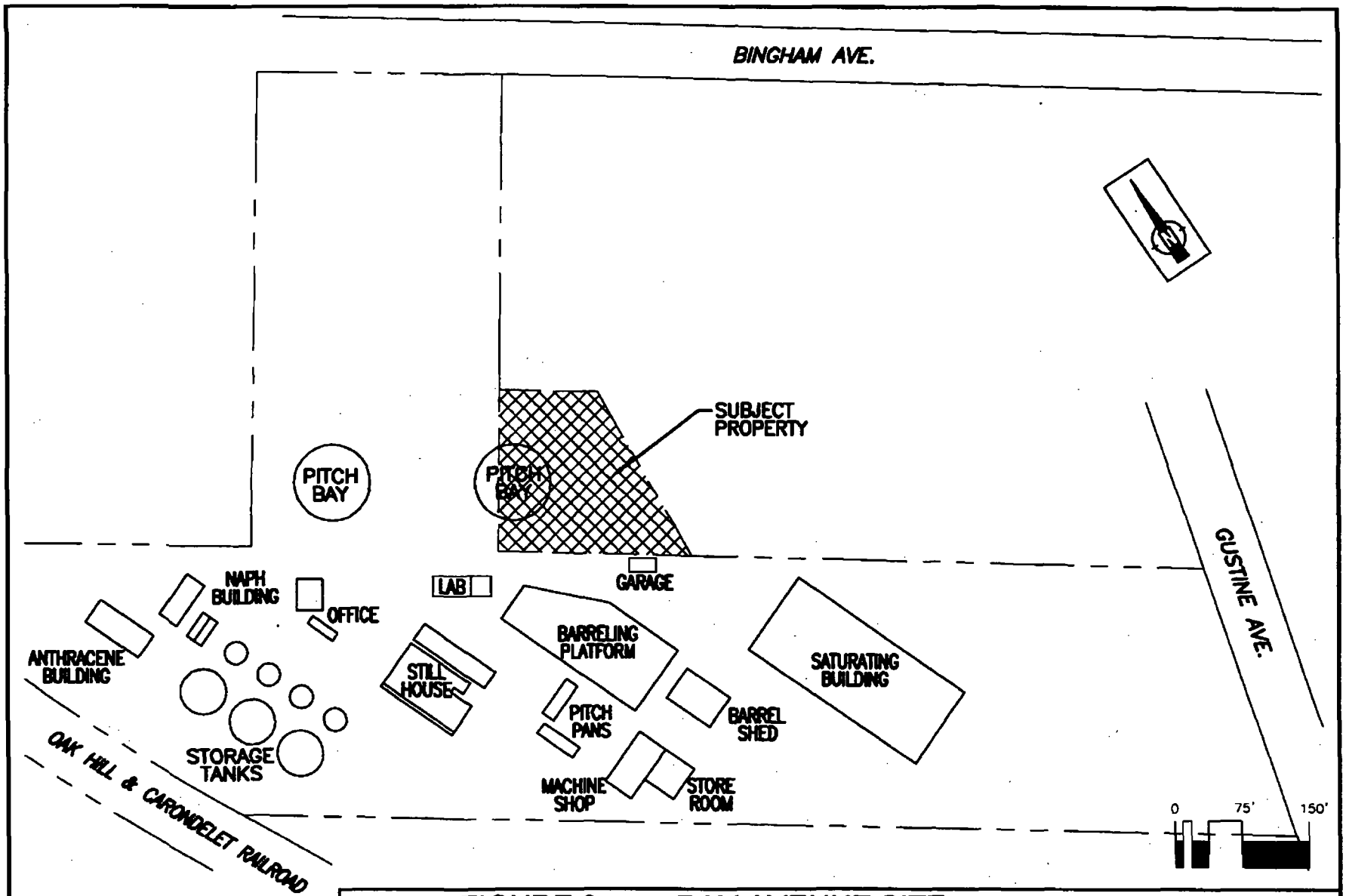


FIGURE 3: RAY AVENUE SITE		
SCALE: 1" = 150'	SHIFRIN & ASSOCIATES, Inc. Environmental Engineers 230 S. Bemiston • Suite 305 • St. Louis, MO 63105	4301 GUSTINE AVE.
MARCH 5, 2009		ST. LOUIS, MO

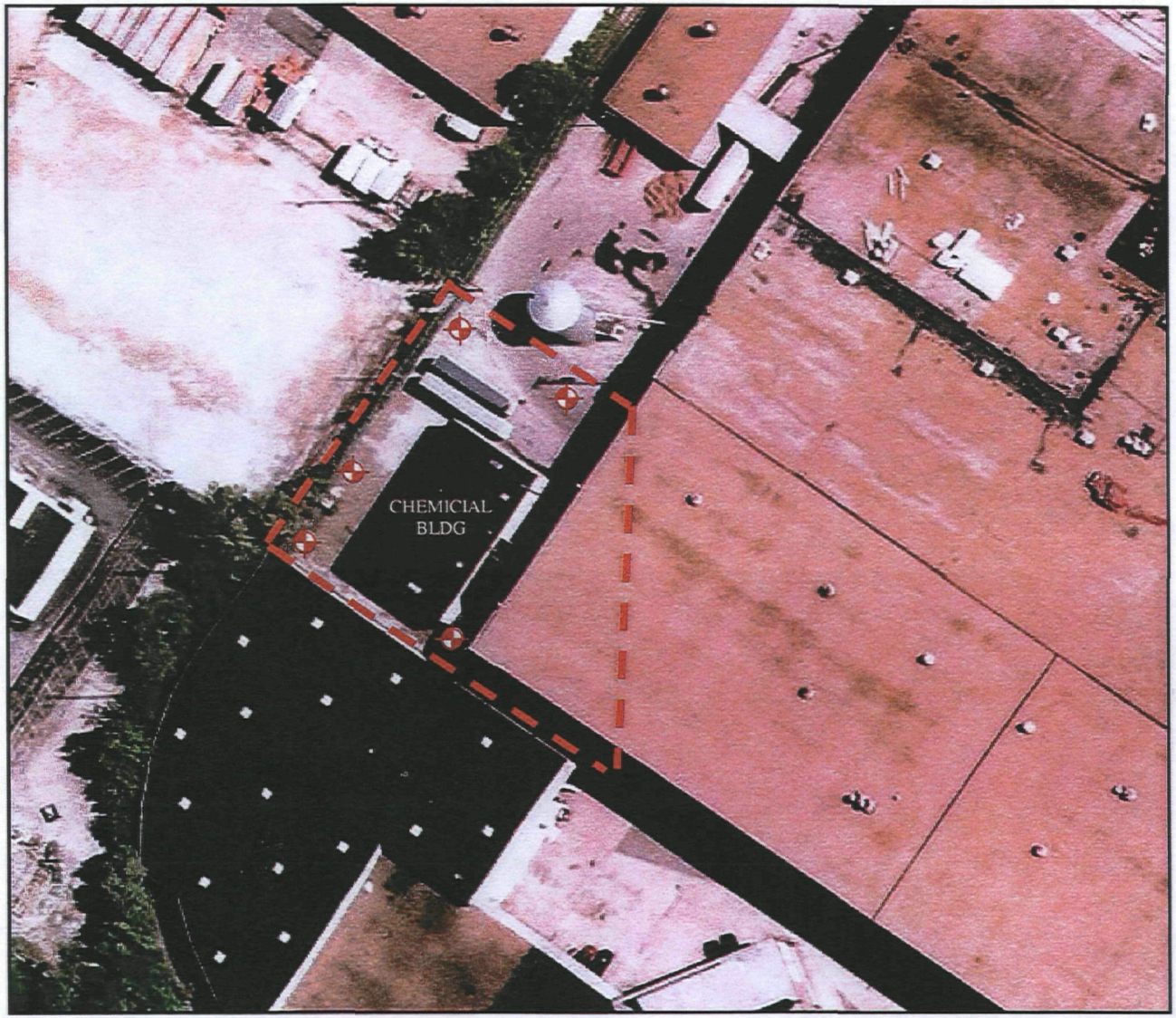


FIGURE 4: PROPOSED BORING LOCATIONS

DATE: 03-09-09	SHIFRIN & ASSOCIATES, inc. Environmental Engineers 230 S. Bemiston • Suite 305 • St. Louis. MO 63105	4301 GUSTINE AVENUE
SCALE: NOT TO SCALE		ST. LOUIS, MISSOURI

EXHIBIT I

42051

STATE OF MISSOURI
Roger B. Wilson
Governor • Stephen M. Mahfood, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

WBS
SAMT
FILE

November 28, 2000

Mr. Harry T. Bussmann, III
Gustine Avenue Partnership
c/o Tri-Star Industrial Supply, Inc.
10435 Baur Boulevard
St. Louis, MO 63132

RE: USCO Distribution Services, Inc., 4327 Gustine Avenue, St. Louis, MO - ST0007550
Closure on Four Toluene Underground Storage Tanks (USTs)

Dear Mr. Bussmann:

The Tanks Section of the Hazardous Waste Program has received and reviewed correspondence dated August 28, 2000, submitted by Shifrin & Associates, Incorporated, for the above referenced facility. It appears that the four toluene USTs in question are located at 4327 Gustine Avenue and are associated with ST0007550. They are not associated with the USTs located at 4301 Gustine Avenue, ST0007531. The department issued a no further action letter for the USTs at ST0007531 on March 24, 1992. Please accept our apology for any confusion this has caused.

The information provided for the four toluene USTs associated with ST0007550 satisfactorily resolves the issues noted in the department's letter dated February 7, 2000.

Therefore, based upon a review of the analytical data and other information submitted, the department finds that no additional investigation or remedial action is currently required with regard to these petroleum substances. However, the department's finding is based solely on the information contained in these reports, and this finding does not constitute a certification or guarantee of the quality of the remedial action conducted or with regard to the lack of contamination on the property.

In the event a future petroleum-related environmental problem arises in the vicinity of this property, the department expressly reserves the right to require responsible parties to conduct additional investigation and/or remedial actions.

If you have any questions regarding this letter, please contact Mr. Ken Koon of my staff at (573) 751-6822.

Sincerely,

HAZARDOUS WASTE PROGRAM

Jim Growney, Chief
Remediation Unit

JG:kkm

c: Mr. David Pate, Petroleum Storage Tank Insurance Fund
Mr. Walter Shifrin, Shifrin & Associates, Inc.
Mr. Mike Struckhoff, St. Louis Regional Office

EXHIBIT II

QUALITY ASSURANCE PROJECT PLAN

BLR Redevelopment Corporation
4327 Gustine Avenue
St. Louis, Missouri 63116

April 24, 2009

Prepared for:

BLR Redevelopment Corporation
13400 Lakefront Drive
Earth City, Missouri 63045

Prepared by:

Shifrin & Associates, Inc.
230 S. Bemiston Ave. Suite 305
St. Louis, Missouri 63105
314-721-2249

TITLE AND APPROVAL SHEET

BLR Redevelopment Corporation
4327 Gustine Avenue
St. Louis, Missouri 63116

QUALITY ASSURANCE PROJECT PLAN

(BLR Redevelopment Corporation)

4327 Gustine Avenue, St. Louis, Missouri

April 24, 2009

Catherine Garrett — 6-24-09

Catherine Garrett — Date

USEPA Region VII

Harry T. Bussmann, III — 6/15/09

Harry T. Bussmann, III — Date

BLR Redevelopment Corporation

6.15.09

Walter G. Shifrin, P.E., Project Manager — Date

Shifrin & Associates, Inc.

Diane Harris — 06/29/2009

Diane Harris — Date

EPA Regional Quality Assurance Manager

TABLE OF CONTENTS

LIST OF EXHIBITS

ACRONYMS

ATSDR	Agency for Toxic Substances and Disease Registry
BLR	BLR Redevelopment Corporation
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COC	Chain-of-Custody
DO	Dissolved Oxygen
DQO	Data Quality Objective
EDD	Electronic Data Deliverable
FD	Field Duplicate
FID	Flame Ionization Detector
FOL	Field Operations Leader
FTP	File Transfer Protocol
gpd	Gallons per Day
HASP	Health and Safety Plan
HSM	Health and Safety Manager
IDW	Investigation-Derived Wastes
L	Liter
LCS	Laboratory Control Sample
LEL	Lower Explosive Limit
LNAPL	Light Non-Aqueous Phase Liquid
MCL	Maximum Contaminant Level
MDNR	Missouri Department of Natural Resources
ml	Milliliter
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MTBE	Methyl Tert-Butyl Ether
NELAP	National Environmental Laboratory Accreditation Program
NVLAP	National Voluntary Laboratory Accreditation Program
O.D.	Outside diameter
O&M	Operations and Maintenance
ORP	Oxidation/Reduction Potential
OSHA	Occupational Safety and Health Administration
%R	Percent Recovery
PARCCS	Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity
PID	Photoionization detector
PVC	Polyvinyl chloride
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality control

RCRA	Resource Conservation and Recovery Act
RO	Remediation Objective
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
SAP	Sampling and Analysis Plan
Shifrin	Shifrin and Associates, Inc.
SOP	Standard Operating Procedure
SRM	Standard Reference Material
µg	Microgram
µg/L	Micrograms per liter
USEPA	U.S. Environmental Protection Agency
VOC	Volatile organic compound

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared for implementation of the Site Characterization Work Plan for 4327 Gustine Avenue, St. Louis, Missouri 63116. The QAPP is prepared according with USEPA's specifications and guidance for QAPPs (USEPA, 2001 and USEPA, 2002).

The objective of the QAPP is to establish the requirements for generating project data that are technically valid and legally defensible. Therefore, the QAPP addresses the four major quality assurance (QA)/quality control (QC) groups:

- Project Management
- Data Generation and Acquisition
- Assessment and Oversight
- Data Validation and Usability.

The organization of the document is as follows:

- Section 1.0: Provides an introduction to the document
- Section 2.0: Presents project management information, including project organization, responsibilities of key individuals, project background information, the definition of the problem to be addressed, a description of the project and the discussion of data quality objectives (DQO)
- Section 3.0: Describes the data measurement and acquisition procedures with respect to sampling, analytical methods, instrumentation maintenance and calibration and QC requirements
- Section 4.0: Defines assessment and oversight activities to verify conformance and to address nonconformance
- Section 5.0: Discusses the data validation and usability requirements
- Section 6.0: References

2.0 PROJECT ORGANIZATION AND MANAGEMENT

2.1 Project / Task Organization

This section identifies the organizations involved in the project, specifies key project individuals and describes the responsibilities of the key project individuals.

2.1.1 Key Individuals and Responsibilities

2.1.1.1 Key Individuals/Organizations

Table 1-1 contains contact information for key individuals and regulatory agency representatives.

The approving authority for this project is USEPA Region VII. USEPA has designated Ms. Catherine Barrett as the Remedial Project Manager (RPM) and Project Coordinator.

Shifrin & Associates, Inc. (Shifrin) is under contract with BLR Redevelopment Corporation to implement the field activities in St. Louis, Missouri in accordance with the Site Characterization Work Plan. Shifrin has established a hierarchy of personnel for implementing administrative policies and procedures to ensure that the QAPP objectives are met. The Shifrin team members are located in the firm's St. Louis, Missouri offices. The Shifrin and subcontractor field teams will be adequately staffed to implement the project objectives and to acquire data that are valid, reliable, and defensible to address the issues at hand. Individuals assigned to this project will possess the experience and training necessary to perform their assigned functions.

2.1.1.2 Responsibilities of Key Shifrin Individuals

The duties of the key individuals are discussed below.

- Project Manager (Walter G. Shifrin, P.E.). The Project Manager will perform duties as required in the implementation and management of this project. The Project Manager will be responsible for day-to-day activities, such as, but not limited to, QC, data management activities and report preparation. Mr. Shifrin will also be responsible for the proposed investigations.

- Health and Safety Manager (Randy Spencer) The Health and Safety Manager (HSM) is responsible for controlling specific health and safety-related field operations. The HSM is responsible for resolving site health and safety problems and will have the authority to stop work, when that work appears to jeopardize safety. The HSM's responsibilities are further detailed in the HASP for the site. The HSM reports to the Project Manager.

- Quality Assurance Quality Control Manager (Walter G. Shifrin). The Quality Assurance Quality Control Manager will oversee all QA/QC issues. These duties will

include providing QA guidance for resolving technical problems and the authority to recommend that work be stopped when that work appears to jeopardize the quality of the project efforts. Additional responsibilities include identifying laboratory analytical methods and laboratory QA/QC, conducting field audits, ensuring data are properly reviewed, data processing QA/QC and project QA audits.

- Resumes for key personnel are attached as Exhibit I. The responsibilities will evolve and changes to personnel will be communicated with USEPA.

2.1.2 Key Subcontractors

Key subcontractors have been identified and will be utilized for performance of specific work activities. All subcontractors are under the direction of Shifrin staff and report to Shifrin. The following organizations have been identified as key subcontractors:

- Teklab, Inc. will be the analytical laboratory for soil samples. Richard Mannz is the Teklab Project Manager. Shifrin will be responsible for coordination and communication with Teklab during this project. Shifrin will work with Teklab to resolve questions concerning sample analysis and laboratory analytical results. Shifrin will receive analytical reports and EDDs directly from Teklab.

- Roberts Environmental Drilling, Inc. (REDI), which is a licensed water well driller in Missouri, will handle boring/well installations, and well abandonment under subcontract to Shifrin. Charley Roberts is the owner of Roberts. Shifrin will be responsible for coordination and communication with Roberts during this project.

2.1.3 Data Processing

Data processing will be performed by Shifrin.

Data processing conducted by Shifrin staff is directed by the Project Manager. The Project Manager is responsible for conducting or designating responsibility for QC activities for data processing and will oversee all QA/QC activities, including those for data processing.

Additional information concerning data processing is provided in the Data Management Plan section.

2.2 Problem Definition and Background

2.2.1 Project Problem

A tar plant operated on the site, a portion of which is currently owned by BLR Redevelopment Corporation (BLR). Beginning in 1914, the tar resulting from Laclede Gas Light Company water gas, pitch gas, coke oven and horizontal retort operations was distilled on the site. The distillery consisted of coal-fired batch stills, a coal-fired boiler house, office and service facilities, a core pitch grinding building, storage tanks and a barrel platform.

Naphthalene and anthracene recovery equipment were constructed at a later date. The tar plant ceased operations in 1953.

Various parcels of the site were subsequently sold. The subject property was purchased by Brown Shoe Company. A manufacturing facility was constructed on the property, which was later purchased by BLR.

2.2.2 Project Background

The site is being investigated by the Potential Responsible Parties (PRPs) to evaluate potential environmental impact associated with the entire operating history of the site. BLR has elected to conduct a separate investigation of the property which they own and has entered into a Administrative Settlement Agreement and Order on Consent for Removal Site Evaluation with the USEPA.

2.3 Project Description and Schedule

This section summarizes the activities to be performed and anticipated schedule.

2.3.1 Description of Work and Schedule

The work and schedule are included in the proposed Work Plan.

BLR will submit a site-specific HASP for USEPA review.

Soil samples will be submitted to Teklab for laboratory analysis for volatile organic compounds, semi-volatile organic compounds, PCBs (surfacial only) and total toxic metals.

Blanks will be collected at the frequency of one equipment blank per 20 samples. One duplicate will be collected per 20 samples. No site-specific matrix spike/matrix spike duplicate (MS/MSD) samples or trip blanks will be collected.

Disposable materials will be stored in plastic garbage bags. Down-hole sampling equipment shall be decontaminated by washing with Alconox and water and rinsing with tap water before each use. The decon water will be contained and kept in 5-gallon buckets. At the end of each day, disposables and decon water will be transferred to the appropriate 55-gallon drums for subsequent characterization and disposal by subcontractors.

- Conduct a daily field health and safety meeting to go over site-specific HASP, project specific issues and confirm use of appropriate PPE.

2.3.1.1 Emergency Equipment

For potential responses to spills, emergency equipment and supplies will be maintained on site.

2.3.2 Schedule

The schedule will be as indicated in the work plan.

2.3.2.1 Modification of Schedules

The Project Manager, in consultation with BLR, will determine if modifications to the schedule are required, and approve the modifications. USEPA will be consulted if the schedule modification significantly affects the project. If schedule modifications are necessary, the Project Manager will notify project participants of the schedule change. At a minimum, this will include USEPA, BLR and subcontractors affected by the modifications.

2.3.3 Data Processing

Shifrin staff conducting data processing will be assigned and directed by the Project Manager. The Project Manager is responsible for conducting or designating responsibility for QC activities for data processing. The Project Manager will oversee all QA/QC activities, including those for data processing.

2.3.3.1 Data Validation

The laboratory data validation will be performed by Shifrin. Additional information concerning the data validation process is provided in Section 5.0.

2.4 Data Quality Objectives (DQOs)

Data Quality Objectives (DQOs) are qualitative and quantitative statements that clearly state the objective of a proposed project, define the most appropriate type of data to collect, determine the appropriate conditions for data collection and specify acceptable decision error limits that establish the quantity and quality of data needed for decision making. The DQOs are based on the use of the data that will be generated. Different data uses may require different quantities of data and levels of quality.

2.4.1 Analytical Quality Objectives

Analytical quality objectives are used to ensure that the analysis will accurately and adequately identify the contaminants of concern and to ensure that the analysis selected will be able to achieve reporting limits less than or equal to the target cleanup levels.

2.4.1.1 Field Screening

Field screening instruments provide a lower quality of analytical data compared to laboratory equipment in a controlled environment. However, field methods provide rapid "real-time" results for field personnel in order to help guide field decision-making processes. Field screening techniques are often used for health and safety monitoring, initial site

characterization to locate areas for detailed assessment and preliminary comparison of remedial objectives. This type of field screening data can include measurements of pH, temperature, specific conductivity, dissolved oxygen (DO), oxidation/reduction potential (ORP), turbidity, or similar monitoring data. During sampling and other field activities, the breathing space of site personnel will be monitored for the presence of organic vapors using a PID and potential explosive atmospheres, if any, using a combustible gas meter.

2.4.1.2 Laboratory Analyses

Teklab, a National Environmental Laboratory Accreditation Program (NELAP) certified laboratory, will be the primary laboratory for this project for analyses of soil samples. Copies of the Teklab NELAP certificates are included in the Teklab Quality Assurance Manual which may be found on the enclosed disk.

2.4.2 Project Quality Objectives

The project quality objectives process is a series of planning steps designed to ensure that the type, quantity and quality of environmental data used in decision making are appropriate for the intended application. Five steps in the project quality objectives process include problem statement, decision identification, decision inputs, assessment boundaries and the decision process. The details of these steps are provided in the following sections.

2.4.2.1 Problem Statement

The subject site, which is a portion of the property owned by BLR Redevelopment Corporation, is included in the Union Electric – Ray Avenue Site, a former coal tar plant. The subject property was initially the site of a "pitch bay", a large shallow tank used to cool pitch in the coal tar distillation process. These investigations are to be performed to determine whether or not operations adversely impacted the site.

BLR intends to collect only data required in the order that the terms of the AOC are addressed. These data will be used consistent with the Order to evaluate the site. The site-specific work plan will details the proposed methods for obtaining and evaluating data necessary to meet this objective.

2.4.2.2 Decision Identification

The data will be collected to determine the whether or not concentrations of chemicals of concern exceed cleanup targets for the site.

2.4.2.3 Decision Inputs

Samples of soil will be collected for analysis as described in the work plan in order to assess the level of contamination. Sample results will be evaluated and compared to cleanup target levels.

2.4.2.4 Assessment Boundaries

Site maps are provided as Figure 1 through 4. The assessment boundaries consist of that portion of the former tar plant property which are now owned by BLR and are not covered by permanent structures. The vertical assessment boundary extends from the surface to 15-feet below the ground surface.

2.5 Quality Assurance Objectives for Measurement

The overall QA objective for each project is to develop and implement procedures for field sampling, chain-of-custody (COC), laboratory analysis and data reporting. Specific procedures for sampling, COC, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, audits, preventative maintenance of field equipment and corrective action are described in other sections of this QAPP.

Data quality objectives for measurements during this project will be addressed in terms of precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS). The numerical PARCCS parameters will be determined from the project DQOs to ensure that they are met. The DQOs and resulting PARCCS parameters will require that the sampling be performed using standard methods, with properly operated and calibrated equipment, and conducted by trained personnel.

2.5.1 Precision

Precision is the degree of agreement among repeated measurements of the same parameter under the same or similar conditions. Precision is reported as either relative percent difference (RPD) or relative standard deviation (RSD), depending on the end use of the data. RPD is obtained by dividing the difference between two numbers by their arithmetic mean and multiplying by 100. RSD is obtained by dividing the standard deviation of the values by the arithmetic mean of the values.

2.5.1.1 Field Precision Objectives

Total precision is the measurement of the variability associated with the entire sampling and analysis process. It is determined by analysis of duplicate field samples and measures variability introduced by both the laboratory and field procedures. Field precision will be assessed through the collection and analysis of field duplicate and co-located samples. RPDs will be calculated for the detected analyses from investigative and duplicate samples. Soil samples may not be duplicated due to their heterogeneous nature. Field duplicate or co-located samples will not be collected for each soil sample.

2.5.1.2 Laboratory Precision Objectives

Analytical precision is the measurement of the variability associated with duplicate analyses. Precision may be affected by the natural variation of the matrix, how the contaminant exists

or varies within that matrix, as well as procedural deviations in field and laboratory handling of samples. Both field and laboratory duplicates are required to assess the effect these variables have on the precision of the data. The analysis of laboratory duplicates is used to determine the precision of the analytical method. One laboratory duplicate will be analyzed for every twenty samples.

2.5.2 Accuracy

Accuracy is the extent of agreement between an observed or measured value and the accepted reference, or true, value of the parameter being measured. Accuracy will vary from analysis to analysis because of individual sample and matrix effects. In an individual analysis, accuracy can be measured and expressed in terms of the recovery of surrogate compounds (organic analyses) or recovery of spiked compounds (inorganic analyses). This gives an indication of expected recovery for analyses tending to behave chemically like the spiked or surrogate compounds.

The difference between the observed value and the referenced value includes components of both systematic error (bias) and random error. Laboratories assess the overall accuracy of their instruments and analytical methods (independent of sample matrix effects) through the measurement of "standards", i.e., materials of accepted reference value.

2.5.2.1 Field Accuracy Objectives

The objective for accuracy of the field sample collection procedures will be to ensure that samples are not affected by sources external to the sample, such as sample contamination by ambient conditions or inadequate equipment decontamination procedures. Sampling accuracy will be assessed by evaluating the results of equipment samples for contamination.

Equipment blanks will be collected by pouring laboratory-prepared water or distilled water over or through the field sampling equipment and then collecting rinsate in the proper analytical containers. Equipment blanks must be submitted to the laboratory with investigative samples and analyzed for the same parameters as the investigative samples. Equipment blanks will be prepared at a rate of one per twenty field samples with a minimum of one per day where non-disposable equipment is used.

2.5.2.2 Laboratory Accuracy Objectives

Teklab laboratory accuracy will be assessed by determining percent recoveries (%R) from the analysis of laboratory control samples (LCSs) or standard reference materials (SRMs). The analyses of MS/MSD samples are also utilized to determine laboratory accuracy by determining %R from the analysis of MS/MSD samples. %R of a parameter is obtained by dividing the amount recovered by the true amount added and multiplying by 100. One LCS will be analyzed for every twenty samples. Field MS/MSD samples will not be collected.

The accuracy of the organics analyses also will be monitored through analysis of surrogate compounds. Surrogate compounds are added to each sample, standard, blank, and QC

sample prior to sample preparation and analysis. Surrogate compounds are not expected to be found occurring naturally in the samples, but behave analytically similar to the compounds of interest. Consequently, surrogate compound percent recoveries will provide information on the effect that the sample matrix exhibits on the accuracy of the analyses and will be compared to the laboratory's established limits.

In addition, please see the enclosed disk for the Teklab Quality Assurance Manual QA objectives.

2.5.3 Representativeness

Representativeness is a qualitative term that describes the extent to which a sampling design adequately reflects the environmental conditions of the site. It also reflects the ability of the sampling team to collect samples and laboratory personnel to analyze those samples in such manners that the data generated accurately and precisely reflect the conditions at the site.

2.5.3.1 Measures to Ensure Representativeness of Field Data

Representativeness will be achieved by establishing the level of allowable uncertainty in the data and then statistically determining the number of samples needed to characterize the population through the DQO process. It will also be achieved by ensuring that sampling locations are properly selected. Representativeness is dependent upon the proper design of the sampling program and will be accomplished by ensuring that this QAPP, the site-specific SAPs, and the standard procedures are followed. The QA goal will be to have all samples and measurements representative of the media sampled.

2.5.3.2 Measures to Ensure Representativeness of Laboratory Data

Representativeness of laboratory data cannot be quantified. However, adherence to the prescribed analytical methods and procedures, including holding times, blanks, and duplicates, will ensure that the laboratory data is representative.

2.5.4 Completeness

Completeness is defined as the measure of the quantity of valid data obtained from a measurement system compared to the quantity that was expected under normal conditions. While a completeness goal of 100 percent is desirable, an overall completeness goal of 90 percent may be realistically achieved under normal field sampling and laboratory analysis conditions.

2.5.4.1 Field Completeness Objectives

Field completeness will be a measure of the quantity of samples collected and analyzed compared to the number planned. The field-sampling team will take measures to ensure data generated in the field is valid. However, some samples may be lost or broken during

handling and transit. Therefore, field completeness goals for this project will be 90 percent.

2.5.4.2 Laboratory Completeness Objectives

Laboratory completeness will be a measure of the quantity of valid data measurements and analyses obtained from all the measurements and analyses completed for the project. The laboratory completeness goal is 90 percent.

2.5.5 Comparability

The confidence with which one data set can be compared to another is a measure of comparability. The ability to compare data sets is particularly critical when a set of data for a specific parameter is compared to historical data for determining trends.

2.5.5.1 Measures to Ensure Comparability of Field Data

Ensuring that this QAPP and site-specific SAPs are adhered to and that all samples are properly handled and analyzed will ensure the comparability of field data. Additionally, efforts will be made to have sampling completed in a consistent manner by the same sampling team.

2.5.5.2 Measures to Ensure Comparability of Laboratory Data

Analytical data are comparable when the data are collected and preserved in the same manner followed by analysis with the same standard method and reporting limits. Data comparability is limited to data from the same environmental media. Analytical method quality specifications have been established to help ensure that the data will produce comparable results. The laboratory detection limits will be required to meet the target standards. The laboratory reporting limits, listed by parameter, are summarized below:

See paragraph 9.4 of the Teklab Quality Assurance Manual

2.5.6 Sensitivity

Sensitivity is the ability of a method or instrument to detect a parameter to be measured at a level of interest.

2.5.6.1 Measures to Ensure Field Sensitivity

The sensitivity of the PID used to screen samples for organic vapors is relative to background readings in ambient air.

2.5.6.2 Measures to Ensure Laboratory Sensitivity

The sensitivity requirements for the laboratory analyses are to detect analyses at levels near or below any target standards, which may be defined as the project progresses, or near the typical laboratory levels for the EPA standard available method, as given in section 2.5.5.2

above. If analytical methods are deemed to be insufficiently sensitive, alternative analytical methods may be utilized.

2.6 General Individual Training

All project personnel receive relevant technical and administrative training. Such training may include attending project management training, technical writing courses, quality improvement process awareness sessions, quality education process training, sessions or seminars in specific technical areas and health and safety training. The balance of this section focuses on the Shifrin health and safety program and training in accordance with Occupational Safety and Health Administration (OSHA) Standard 29 Code of Federal Regulations (CFR) 1910.120.

As required under OSHA Standard 29 CFR 1910.120, Shifrin employees and their subcontractors are required to obtain the appropriate level of training prior to working at Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites or at certain Resource Conservation and Recovery Act (RCRA) sites. Shifrin personnel are trained in accordance with Shifrin Health and Safety Policies. Subcontractors must provide documentation to Shifrin of their compliance with 29 CFR 1910.120 training requirements.

2.6.1 29 CFR 1910.120 Training

The level of training that is required is specified in Shifrin's health and safety policies and is dependent upon the level of involvement in site work:

- 40-hour initial training, with an additional minimum of three days supervised field experience, is required for general site workers;
- 24-hour initial training, with an additional minimum of one day of supervised field experience, is required for occasional site workers;
- 24-hour initial training, with an additional minimum of one day of supervised field experience, is required for workers who are regularly on site but who work in areas that are monitored and fully characterized with exposures under permissible exposure limits and published exposure limits, respirators are not necessary, and no health hazards exist nor the possibility of an emergency developing;
- 8-hour management and supervisor training is required for the supervisor;
- 8-hour refresher training is required on an annual basis after the initial 40-hour or 24-hour training for those individual listed above; and
- Each of the field training requirements specified above requires that the training be conducted under the direct supervision of a trained, experienced supervisor.

The content of each training program must comply with 29 CFR 1910.120 paragraph (e)(2).

2.6.2 Site-Specific Training

Health and safety training is required for all subcontractors before initiation of any site work. The number of hours required for the site-specific training is dependent on the site, the task performed and the role of the individual performing the specific task. The site-specific HASP provides the basis for the site-specific training.

2.6.3 Task-Specific Training

The Shifrin Project Manager is responsible for ensuring that field team individuals are trained in the calibration, use, and maintenance of all applicable field equipment and that office staff are qualified to conduct the tasks requested of them.

The use, calibration, and maintenance of field equipment will be limited to those persons who have been trained in the appropriate procedures and SOPs.

Participating field or laboratory organizations must have established individual qualifications, training requirements and SOPs for the activities to be conducted by their individual laboratories.

2.6.4 Training Records Maintenance

As stated above, all Shifrin employees are required to complete the health and safety training. Shifrin maintains documentation of each employee's date of initial health and safety training, refresher training and management/supervisory training in the health and safety records at the employee's respective office location. Written documentation also is provided to all Shifrin individuals who successfully complete the training. Shifrin personnel also participate in a medical monitoring program. Baseline and annual physical examinations are required and results are evaluated and maintained by a licensed, qualified physician.

2.7 Documents and Records

This section provides information concerning the preparation, distribution and maintenance of project documents and records. Records generated during field activities are a crucial part of any assessment. Shifrin will use select documents for recording information during project activities. Records to be used for project documentation include field forms, field books, laboratory data sheets, COC forms and technical papers. The hard copy of project records will be retained at the Shifrin St. Louis office.

All requests for project information shall be directed to the RAM Project Manager. The following subsections describe some of the required documents and records to be maintained.

2.7.1 Project Documents and Reporting

All project deliverables will be reviewed by technically experienced staff before being submitted. These technical reviews will provide the necessary QA/QC on all deliverables.

2.7.1.1 Shifrin Documents

The HASP for the site provides safe procedures and practices for Shifrin personnel engaged in conducting site specific tasks (i.e., soil sampling) at the site.

The draft and final report submittal packages will include the following, as necessary:

- Text describing field-sampling methodologies, analytical results, conclusions and recommendations
- Figures showing site location, site boundaries and sampling locations
- Tables comparing laboratory data to the applicable standards
- Tables summarizing QA/QC analytical results
- Complete laboratory data reports, including copies of COC records
- Copies of soil sampling logs
- Other relevant material needed to support conclusions and recommendations

2.7.1.2 Progress Report Documents

2.7.1.3 QAPP Documents

2.7.2 Field Records

The required documentation for field and site logbooks and other field documentation of activities is provided in Section 3.3.3 titled Field Documentation/Logbooks.

2.7.3 Other Project Records and Document Control

All documents outlined below shall be kept in the project files. Files shall be maintained for 10 years following completion of the project. All original documents relating to inspections and investigations shall be placed in the project files. At a minimum, the following documents shall be placed in the project file, if applicable:

- An original copy of all planning documents (e.g., QAPP; HASP; etc.). Any approved changes to these documents.

- Original COC records and bound field and site logbooks

- Field records generated during the investigation

- Complete original copy of the analytical data and memoranda transmitting analytical data. The analytical data include, but are not limited to, the laboratory sample receipt confirmation form, the laboratory analytical report, memos-to-file prepared to document corrections of errors made in sampling or laboratory records and the data review report

- Original copies of field measurement data collection forms (e.g., borehole logging forms) and documentation

- Correspondence transmitted to or received from USEPA and/or pertinent to the investigation

- Photographs pertinent to the field services

- One file copy of all final documents submitted to USEPA along with their transmittal memorandum(s)

The Shifrin Project Manager shall review the file at the conclusion of the project for completeness.

3.0 DATA GENERATION AND ACQUISITION

This group of quality elements addresses measurement system design and implementation, including appropriate methods for sampling, analysis, data handling and QC documentation.

3.1 Sampling Process Design

Environmental sampling includes the collection of soil samples.

3.2 Sampling Methods Requirements

3.2.1 Sample/Data Collection Procedures

The overall sampling and data collection program is presented in this QAPP, which provides sampling QC criteria, analytical methods and other details related to the collection of samples.

Specific sampling and data collection procedures are described in the work plan.

To the extent possible, disposable sampling equipment and supplies will be used. Decontamination of sampling equipment will be conducted in accordance with the work plan and Section 2.3.1 herein.

3.2.2 Equipment Required

This section lists the key equipment required to conduct field activities. It is anticipated that the specific equipment identified below will be used, however, if the specified equipment is not available (e.g., discontinued model, equipment failure), equivalent equipment can be used.

- PID - MiniRae 2000, calibration gas and regulator
- First aid kits
- Eye wash kits

Critical Supplies: Soil samples will be collected in laboratory-provided bottle ware. In the unlikely event that such bottle ware is not available, bottle ware obtained from a commercial supplier that meets or exceeds purity requirements stated in USEPA document "A Compendium of Superfund Field Operations," (USEPA, 1987) may be used for all parameters.

The critical equipment and supplies contingency plan consists of either maintaining a spare of the equipment or supplies at the site during field operations, or ensuring that a replacement can be delivered via overnight courier to minimize potential down times.

3.3 Sample Handling and Custody Requirements

3.3.1 Sample Custody and Documentation

Sample custody procedures ensure the timely, correct and complete analysis of each sample for all parameters requested. The procedure provides for specific identification of samples associated with the location, the recording of pertinent information associated with the sample, which serves as physical evidence of sample custody. Sample custody documentation will be maintained using a laboratory supplied COCs.

The COC form serves as an official communication to the laboratory detailing the particular analyses required for each sample. The COC record will accompany the samples from the time of sampling through all transfers of custody. It will be kept on file at the laboratory where samples are analyzed and archived. The custody record is completed in duplicate by the individual designated by the FOL as being responsible for sample shipment. One copy is retained by the FOL and one is sent to the laboratory. The information on this record shall include at minimum:

- Project name
- Project location
- Sample identification
- Sample date
- Sample time of collection
- Grab or composite designation
- Sample matrix
- Preservation
- Number and types of sample container
- Analysis requested
- Samplers' signature, date and time
- Signature of individuals involved in sample transfer, date and time
- If applicable, the air bill or other shipping number.

The FOL completes a COC record to accompany each shipment from the field to the laboratory. The completed COC is put in a zip-lock bag and taped to the inside cover of the sample shipping container. The container is then sealed with custody seals and custody is transferred to the laboratory. Custody seals are not required for samples picked up directly by a laboratory representative from the sampling crew or delivered directly to the laboratory by the FOL.

3.3.2 Sample Collection Custody Procedures

The person doing the actual field sampling is responsible for the care and custody of the samples collected until the samples are properly transferred or dispatched.

A sample must remain under custody if it is in:

- Possession of the sampler/analyst
- View, after being in the possession of the sampler/analyst
- Possession of the sampler/analyst and then placed in a secured location
- Designated secure area.

When transferring custody of samples, the individuals relinquishing and receiving will sign, date and note the time on the COC. This form documents sample custody transfer from the FOL or designee, through the shipper, to the analytical laboratory. Since a common carrier will usually not accept responsibility for handling COC forms, the name of the carrier is entered under "Received by" and the bill-of-lading number is recorded in the comments section.

3.3.2.1 Sample Identifiers

Sample labels will be completed for each sample container, using waterproof ink. Appropriate sample description and other pertinent information must be recorded in the field logbook.

Each sample container will be labeled (D). The project name or number, sample identifier, analysis to be performed, sampling date and time of collection, initials of person who collected the sample and preservation information will be written on the label affixed to each sample container. All soil samples will be marked as grab samples. In addition, sample-specific information for the laboratory (e.g., odor, color) may be written on the label.

For this project, the following labeling conventions shall be utilized for completing sample container labels:

Client: BLR, or as otherwise directed by the Project Manager.

3.3.2.1.1 Soil Sample

Soil sample identifiers will be based on the boring identifier and will be unique for each sampling location. If a sampling location must be relocated, a new sample identifier will be assigned. Each sample identifier will start with the boring location. The boring location will be an uppercase, alphabetic prefix followed by a hyphen and a numeric location and the depth of sample. Duplicate samples are indicated by a superscript numeral "1" at the end of the sample identifier.

3.3.2.1.2 Field QC Sample

The sample identifiers for field QC samples (i.e., trip blanks and equipment blanks) will be as follows:

Trip blanks will be identified with a "TB" followed by a hyphen and then sequential integer beginning with "1" and continuing for all TB samples used for VOC sample shipments on the same day.

Equipment blanks will be identified with a "EB" followed by a hyphen and then sequential integer beginning with "1" and continuing for all EB samples collected on the same day.

The following are examples:

- TB-1 is first trip blank sample used for shipping VOC samples for the day.
- EB-3 is third equipment blank sample prepared for the day.

3.3.2.1.3 Waste Disposal Characterization Sample

Waste disposal characterization sample identifiers will be decided on a sample-by-sample basis, when those samples are needed.

3.3.2.1.4 Analytical Methods and Shipping Address

Soil Samples

All off-site laboratory analyses will be performed by Teklab with their standard turn-around-time. The work plan describes the samples to be collected. Teklab will pickup samples at the project site or Shifrin office.

Sample Shipping Address:

5445 Horseshoe Lake Road
Collinsville, Illinois 62234
618-344-1004

Preservatives

The work plan specifies the sample preservation requirements for each test method and sample matrix.

3.3.3 Field Documentation/Logbooks

Bound site and field logbooks shall be maintained during the field activities. All logbooks will be dedicated to the field work activities. The site logbook shall be maintained by the FOL. The site logbook will contain a general description of all activities being conducted on-site. The site logbook will also contain entries for activities being conducted by the FOL; if the FOL is working as a member of a field team, the FOL will utilize the site logbook to document that team's activities, in addition to overall site activities (i.e., the FOL is not required to maintain separate Site and field logbooks.

The following information will be included on the front cover, or inside of the front cover, of the logbook if the logbook design does not allow the information to be written on the front cover:

- Project Name: BLR
- Project Number: 09014
- Start Date: in MM/DD/YY format;
- End Date: in MM/DD/YY format; and
- Logbook Number: (logbooks will be numbered BLR-#, where # is a consecutive number starting at 1 and incrementing by 1 for each logbook used).

Each page in the logbook shall contain pre-printed numbers. Every page of the logbook shall be signed and dated at the bottom of the page (or in the space printed in the logbook) by the person who made the entries on that page. Blank space at the end of a page shall be struck through above and the recorder's signature and the date shall be entered immediately below the blank space strike through. The entries will be legible and contain accurate and inclusive documentation for the project activities. Logbook entries will be made using indelible ink; no erasures shall be made. If an incorrect entry is made, the correction will be made by striking a single line through the incorrect information, such that the original entry remains readable, and the person making the correction will initial and date the change. Field records are the basis for later written reports; therefore, language will be objective, factual, and free of personal feelings or other terminology, which might prove inappropriate. Once completed, these field logbooks become accountable documents and will be maintained as part of the project files. All aspects of sample collection and handling, as well as visual observations, will be documented in the field logbooks. The following is a detailed list of the types of information that will be included in the logbook. Documentation of field activities is not limited to the items in the list; additional information should be provided to document additional field activities, as appropriate.

3.3.3.1 General Documentation

- Name and affiliation of persons on-site;
- Records of site visitations (arrivals and departures);
- Name of Shifrin FOL, HSM, etc.;
- Documentation of Health and Safety Briefings;
- Description of general weather conditions;
- Documentation of accidents involving on-site individual; and
- General description of each day's field activities and objectives.

3.3.3.2 Sample Collection

Sample collection will be conducted in accordance with the procedures outlined in the work plan. The equipment used to collect the sample will be noted in the logbook, along with date and time of sampling, sampler's name, sample description, depth at which the sample was collected and the volume and number of containers collected. QC sample information will be appropriately recorded. The following list contains additional appropriate types of documentation.

- Sample collection, boring, or drilling equipment (when applicable)

- Field analytical equipment and equipment utilized to make physical remedies
- Sample chain-of-custody/traffic report numbers
- Type of sample matrix (e.g., soil)
- Sample type (grab or composite)
- Location of sampling station, boring or well (station number and description)
- Observations concerning sample of collection environment or conditions
- Sketch of sample, boring, or well location to document location
- Bottle lot numbers for samples collected
- Date and time (military format) of sample collection, boring, or well installation
- Description of weather conditions during sampling
- Sources and types of preservatives and supplies used (description and lot numbers)
- Sample distribution (e.g., laboratory, courier)
- Calculations, results, and calibration data for field sampling, field analytical, and other field measurement equipment
- Records of equipment calibration and calibration standards (manufacturer, description, expiration date, and lot number)
- Field analytical equipment, and equipment utilized to make physical remedies, identified by manufacturer, model, serial/property number, and where it was obtained
- Person conducting each activity
- Decontamination activities

3.3.3.3 Photographic Documentation

- Picture number
- Date and time (military time)
- Photographer's name
- Location (e.g., boring number)
- Orientation (e.g., facing/looking southwest)
- Subject
- Significant features in photograph
- Names of any individual in the photograph
- Photographer should initial and date each photograph entry made in the logbook

3.3.4 Transfer of Custody and Shipment Procedures

All samples collected during this project will be delivered directly to the laboratory.

Samples collected during this project are anticipated to be environmental soil not hazardous samples. If unusual odors, coloration, or other indications that a sample may be hazardous exist, the FOL must be notified. Such samples may require special handling.

All samples will be packaged in a manner that avoids breakage or contamination. Samples will be transported to the laboratories at proper temperatures to ensure sample preservation.

3.3.4.1 Soil Samples

The following sample packaging requirements will be implemented for soil samples:

- No headspace shall be left in any bottles.
- Sample bottle lids will never be mixed. All sample lids will stay with the original containers
- Each labeled sample container will be placed in its own self-sealing plastic bag to minimize the potential for cross-contamination and the plastic bags will be wrapped around the sample containers and taped with masking tape
- The sample containers will be placed into a shipping cooler
- Ice will be double-bagged and placed in the cooler to maintain the samples 0-6°C.
- Empty space in the cooler will be filled with inert packing material (e.g., vermiculite) to prevent breakage. Under no circumstances will locally obtained material, such as sawdust or sand, be used
- The appropriate copies of the COC document must be placed in a plastic bag and taped to the bottom of the cooler lid
- Strapping tape will be wrapped around the cooler at least three times to ensure the cooler will not accidentally open
- Shipping coolers will have a clearly visible destination laboratory address and return address
- Custody seal on the exterior of the cooler

3.3.5 Laboratory Custody Procedures

Laboratory sample custody procedures are described in Teklab's Quality Assurance Manual (Teklab, 2007).

3.3.6 Problem Resolution and Deviations from the Sampling and Analysis Plans

If, during the process of any phase of the project, any deviations from the SAPs or problems occur, a hierarchical approach to solving the problem will be taken. For example, if a problem is encountered in the field and it cannot be solved between the field sampling team members, then the Shifrin Project Manager will be consulted. The Shifrin Project Manager will then seek to solve the problem internally using the appropriate technical resources. If necessary, a formal meeting or teleconference call may be requested with the USEPA to

reach a solution.

In addition, if field team individual encounter conditions that they deem are unsafe they may cease all on-site work. The Shifrin Project Manager will be immediately contacted and consulted. On-site operations will only commence upon agreement that safe working conditions exist and work can proceed without risk to operating individual or residents of adjacent neighborhoods.

During project execution, field individual will be in close contact with the Shifrin Project Manager (or designee) communicating progress of field activities. Daily telephone or on-site discussions will occur to transfer information collected in the field and the status of all field efforts to project team members. Field logbook pages will be copied and submitted to the project team as necessary. The Shifrin Project Manager (or designee) will in turn periodically verbally communicate project status to the BLR Representative.

3.4 Analytical Methods Requirements

The work plan (Section 3.1) provides a detailed summary of the analytical methods and compounds to be analyzed for each matrix. Section 2.5.5.2 provides the laboratory quantitation limits for soil samples.

3.5 Quality Control Requirements

To monitor the quality of the data generated for this project, QC checks to be implemented in the field and in the laboratory are described below.

3.5.1 Field QC Checks

In addition to periodic calibration of field equipment and appropriate documentation, QC samples will be collected or generated during environmental sampling activities.

Equipment Rinsate Blanks (Equipment Blank)

One equipment blank will be submitted per 20 soil samples submitted for laboratory analysis. The equipment blanks will be collected in the field by pouring analyte-free water over decontaminated non-dedicated reusable sampling equipment used to collect environmental samples. The equipment rinsate water will be collected directly into laboratory supplied sample containers. The equipment blanks will be used to confirm the effectiveness of the field decontamination procedures and will be analyzed for the same compounds as the samples.

3.5.1.1 Trip Blanks

No trip blanks will accompany the shipment of soil samples to the laboratory.

3.5.2 Laboratory QC Checks

Laboratory analysis will be conducted in accordance with the appropriate analytical method. Maintenance, calibration, and standardization logbooks shall be maintained by the laboratory and the procedures outlined in the laboratory quality manuals and SOPs contained in on the enclosed disk.

3.6 Instrument/Equipment Testing, Inspection, and Maintenance Requirements

3.6.1 Preventative Maintenance of Field Equipment

Measuring equipment used in environmental monitoring or analysis and test equipment used for calibration and maintenance will be controlled by established procedures. Measuring and test equipment will be initially calibrated and will be recalibrated against certified standards at scheduled intervals. Equipment will be calibrated at least once a year or when maintenance or damage indicates a need for recalibration. Equipment that cannot be calibrated will not be used on-site and must be repaired and recalibrated before subsequent usage. Notice of failure, repair, and recalibration should be noted on the appropriate equipment calibration log sheet and in the site logbook.

In the event that failed equipment cannot be repaired, replacement equipment will be requested from the Shifrin office or vendor that supplied the equipment.

3.6.2 Preventative Maintenance of Laboratory Equipment

Measuring equipment used in environmental monitoring or analysis and test equipment used for calibration and maintenance will be controlled by established procedures. Measuring and test equipment will have an initial calibration and will be recalibrated at scheduled intervals against certified standards. Equipment will be calibrated at least once a year or when maintenance or damage indicates a need for recalibration. Equipment that cannot be calibrated will not be used on-site and must be repaired and recalibrated before subsequent usage. Notice of failure, repair, and recalibration should be noted on the appropriate equipment calibration log sheet and in the site logbook.

In the event that failed equipment cannot be repaired, replacement equipment will be requested from the Shifrin office or vendor that supplied the equipment.

The primary goal of the project laboratories' preventive maintenance programs will be to prevent instrumentation and equipment failure as much as possible and minimize equipment downtime when failures occur. If an instrumentation failure impedes sample analysis, the laboratory will notify the Shifrin Project Manager of the problem so corrective action can be implemented. The preventative maintenance program used by the laboratory is detailed in the laboratory quality manuals contained on the enclosed disk.

3.7 Calibration Procedures and Frequency

3.7.1 Calibration of Field Equipment

It is the Shifrin Project Manager's responsibility to ensure that field team members are trained in the calibration, use and maintenance of all applicable field equipment.

Detailed instructions on the calibration and use of field equipment is provided in manufacturer's operation and maintenance manual.

General Standardization and Calibration Requirements

Instruments requiring calibration shall be calibrated according to their respective manufacturer's specifications, be given an operational check and be calibrated prior to assignment to a project. Only qualified individuals that are knowledgeable in proper operational procedures are permitted to perform instrument calibration. It is the responsibility of the equipment operator/user to ensure that all instruments in their control have been calibrated and are given an operational check prior to field use. Calibration frequency and procedures used shall follow the manufacturer's specifications.

All calibration activities shall be documented to ensure compliance with applicable regulatory standards and with the requirements of this project. Proper and timely documentation is the responsibility of the person(s) performing the calibration. These records shall be updated and maintained for at least the life of the instrument. Any equipment maintenance efforts also shall be documented.

If a problem arises with the equipment during calibration, it will not be used in the field until the problem has been corrected and the equipment has been recalibrated. The user/operator is required to document any problems or malfunctions noted while using an instrument a memorandum to the FOL and Shifrin Project Manager. The memo should include the items listed below at a minimum:

- User/operator's name, office location, and telephone number
- Date and time
- Project job number and name for which the instrument was used
- Identification of the instrument by serial number and company tag number (when available), manufacturer, and model
- Calibration standard
- Initial response

- Detailed description of the circumstances when the problem was encountered
- Clear and complete description of the problem or malfunction, activities or environmental conditions which may have contributed to the problem

- Any other information that might assist in the repair of the instrument and insure it is in proper and safe operating order prior to future use (particularly important when an intermittent problem was encountered).

This information shall be used to inspect, repair and/or maintain instruments.

If any equipment used for this project is rental equipment, it must be demonstrated that the rental equipment will be able to meet the DQOs of the data collection activity for which the equipment is being used. As a result, the equipment supplier will be required to provide adequate documentation of the calibration and maintenance of the rented equipment that will enable the DQOs to be met.

3.7.2 Laboratory Calibration Procedures

The laboratory is responsible for properly calibrating and maintaining analytical instrumentation. The internal QC checks to be used by the laboratory to monitor accuracy, precision, external contamination and extraction efficiency, among others, are detailed in the laboratory quality manuals and SOPs contained on the enclosed disk.

3.8 Inspection/Acceptance Requirements for Supplies and Consumables

Sample containers must be pre-cleaned and supplied by the laboratory performing the analysis of the samples. Sample containers will be supplied by the laboratory. In the unlikely event that such bottle ware is not available, bottle ware obtained from a commercial supplier, that meets or exceeds purity requirements stated in the document "A Compendium of Superfund Field Operations," (USEPA, 1987) may be used for all parameters; documentation and certification of the cleaning process will be maintained. Materials purchased for blanks will be documented, including the source, grade, and supplier. All other consumables must be purchased clean or decontaminated prior to use. Disposable equipment will be bagged and disposed of as solid waste.

Consumables and supplies shall be assumed to meet manufacturer's certification and project specifications. Routine testing of supplies will be implemented if it is suspected that supplies do not meet certification and specification requirements.

The FOL shall ensure that the records of critical supplies or consumables and documentation of certifications are provided to the Shifrin Project Manager who shall file the records in the project files. It is not anticipated that any such materials will be required for this study, unless sampling containers or preservatives need to be procured from a source other than the laboratory performing the sample analysis.

3.9 Data Acquisition Requirement (Non-Direct Measurements)

Prior to the use of non-direct or existing data (e.g., data collected at prior times at the site or from databases regarding related studies), the data must be assessed for its accuracy, representativeness and comparability to determine its usability in terms of the DQOs.

3.10 Data Management Plan

This data management plan addresses the procedures to be followed for the assembly, manipulation, and evaluation of laboratory and field data. Analytical data will be reviewed in accordance with procedures specified in Section 5.0 of this QAPP.

3.10.1 Management of Laboratory Analytical Data

This section describes the project data management process and traces the path of the data from their generation to their final use or storage. Laboratory analytical data collected for this project will be stored electronically in Shifrin's office.

The chronology of the laboratory analytical data management steps will be:

1. The FOL will provide a copy of the COC to the Shifrin Project Manager by the morning following the day samples are shipped. Samples will be shipped the day of sample collection, except under extreme circumstances.

2. Within 24 hours of receipt of samples, the laboratory will e-mail a sample receipt confirmation form to the Shifrin Project Manager. If the sample receipt confirmation is not received within approximately 48 hours of sample shipping, the laboratory will be contacted to determine the status of the sample shipment. The laboratory sample receipt confirmation will include a laboratory tracking number (the sample delivery group number), the date samples were received, the project name and number, and a list of samples received by the laboratory. The sample receipt confirmation will be compared to the COC to identify problems with sample shipments, sample numbers, holding times, or scheduled analyses. A copy of the COC form is attached.

3. Teklab will submit their analytical reports electronically upon completion of the analyses and internal laboratory review of the results.

4. All data submittals from the laboratory will be compared by designated Shifrin personnel to ensure data verification.

5. If laboratory errors or omissions are identified by the designated Shifrin personnel, the Shifrin Project Manager (or designee) will contact the laboratory.

6. All laboratory analytical results will be validated by the procedures described in

Section 5.0.

7. If laboratory errors or omissions are identified by the data validator, the data validator will contact the laboratory directly.

8. Upon receipt of the validated data, the data validation report narrative will be reviewed to identify data quality problems. If any corrections are identified, it will be verified that the validation report narrative has adequately explained the reason for the correction.

4.0 ASSESSMENT AND OVERSIGHT

4.1 Assessment Activities and Project Planning

4.1.1 Field Audits and Assessment Activities

QA will be an ongoing process during field activities. The FOL is responsible for ensuring that field activities follow the requirements specified in this QAPP and that good field practices are followed.

In addition, at the completion of each sampling activity, all field records pertinent to the sampling event will be reviewed by the Shifrin Project Manager, or a designee, to check for compliance with the procedures outlined in this QAPP. All findings will become part of the permanent project file and will be provided to USEPA on request.

Field QA will include verification of the following:

- Completeness and accuracy of sample COC forms, including documentation of times, dates, transaction descriptions and signatures

- Completeness and accuracy of sample identification labels, including notation of time, date, location, type of sample, person collecting sample, preservation method used and type of testing required

- Completeness and accuracy of field logbooks, including documentation of times, dates, sampling methods, sampling locations, number of samples taken (including QA/QC samples), name(s) of person(s) collecting samples, types of samples (including QA/QC samples), results of field remedies and any problems encountered during sampling

- Adherence to sample collection, preparation, preservation and packaging procedures;

- Equipment maintenance and calibration

- Decontamination procedures, if applicable

- Sample packing and shipment.

Field audits will consist of Loss Prevention Observations performed by Shifrin.

Any findings that require immediate corrective action will be reported immediately to the FOL and a temporary Stop-Work Order will be issued until the deficiencies are corrected. If major deficiencies are noted (i.e., those that cannot be immediately corrected in the field), a Stop-Work Order will also be issued and the Shifrin Project Manager will be notified. The Stop-Work Order will be in effect until appropriate measures can be taken to correct the problem. The conditions for the Stop-Work Order will be documented in sufficient detail to permit evaluation of the deficiency and determination of proper corrective action(s). Concurrence of the Shifrin HSM and FOL must be obtained to resume work activities.

4.1.2 Laboratory Quality Control Audits and Assessment Activities

The internal QC checks to be used by the laboratory to monitor accuracy, precision, external contamination and extraction efficiency, among others, are detailed in the laboratory quality manuals and SOPs contained on the enclosed disk.

4.1.3 Documentation of Field Assessments

A report of the field audit will be prepared by and submitted to the Shifrin Project Manager and will be placed in the project files. The report will include corrective actions required and taken to resolve QA/QC issues identified by the field audit.

4.2 Corrective Action

When a significant condition adverse to quality is noted in the field or at the laboratory, the cause of the condition will be determined and corrective action taken to preclude repetition. Condition identification, cause, reference documents and corrective action to be taken will be documented and reported to the appropriate individuals. Implementation of corrective action is verified by documented follow-up action.

Acceptance limits for sampling and chemical analysis during this project will be consistent with those stated in the methods or defined by other means in other sections. Corrective actions are often immediate in nature and require implementation by the analyst, sampling individual, or the Shifrin Project Manager. The corrective action implemented immediately may involve re-calculation, re-analysis or re-sampling. Long-term corrective action may be identified through analysis of performance evaluation samples, standards and control charts. In either case, the corrective action taken must be properly documented.

All items requiring corrective action for field activities will be reported to and approved by the Shifrin Project Manager. All items requiring corrective action for laboratory activities will be reported to and approved by the Shifrin Project Manager. All submitted corrective action reports will be maintained by the Shifrin Project Manager in the project file and will be made available to USEPA upon request.

4.2.1 Immediate Corrective Action

If an immediate corrective action can be taken, as part of normal operating procedures, the collection of poor quality data may be avoided. Instrument and equipment malfunctions are amenable to this type of action. The corrective actions taken will be noted in field or laboratory notebooks, but no other formal documentation is required, unless further action is necessary.

Corrective action during the field sampling program is most often due to equipment failure or an operator-type error and may require that the sample be re-analyzed. Operator oversights will be avoided by having field individual audit each other's work prior to and after sample collection. Every effort will be made by the field team to ensure that all QC procedures are followed. Problems not solvable by immediate corrective action will be defaulted to a formalized long-term corrective action program.

Procedures for implementing immediate corrective action for analytical work will be based on procedures outlined in the laboratory's QA plan.

4.2.2 Long-Term Corrective Action

Long-term corrective action can be identified by the laboratory quality manuals and SOPs (C), control charts, or performance and system audits. Any problem that cannot be resolved by immediate corrective action falls into the long-term corrective action category. It is essential that the data quality problem be reported to the person responsible for correcting it.

The following are essential steps in the corrective action program:

- Identify and define the problem
- Assign responsibility for investigation of the problem
- Investigate and determine the cause of the problem
- Determine a corrective action to eliminate the problem
- Assign and accept responsibility for implementing the corrective action
- Establish the effectiveness of the corrective action and implement the corrective action
- Verify that the corrective action has eliminated the problem

Documentation of the problem is essential to the system. Whenever a data quality problem is discovered, the person identifying the problem must document the problem, list possible causes, identify the person(s) responsible for the problem and describe the corrective action that will be taken. The Shifrin Project Manager, or designee (for field issues), and the laboratory Quality Assurance Manager (for laboratory issues) will make checks to ensure that initial action was taken and that it appears effective and, at a later date, will check again to see if the problem has been fully resolved. All submitted corrective action reports become an integral part of the project files and will be made available to USEPA, upon request.

5.0 DATA VALIDATION AND USABILITY

5.1 Data Validation

The laboratory data will be reviewed in accordance with:

- *United States Environmental Protection Agency (USEPA), 1999. Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review,* October 1999.

5.2 Data Deliverables

The laboratory analytical package for organics will be the Teklab Level II package.

The following definitions provide explanations of the data qualifier flags assigned to results for organic compounds by the laboratory. The laboratory must flag any data associated with low or high matrix-spike-recovery issues or other abnormal analytical conditions that deviate from stated method procedures.

Teklab Data Qualifier Flags

- B – Analyte detected in associated Method Blank
- E – Value above quantitation range
- H – Holding times exceeded
- J – Analyte detected below quantitation limits
- R – RPD outside accepted recovery limits
- S – Spike Recovery outside recovery limits
- X – Value exceeds MCL

5.3 Data Review, Validation, and Verification Requirements

The laboratory data validation will be performed by Shifrin.

The validation will be completed in accord with the *Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review* (US EPA, 1999) using the Level II data packages supplied by Teklab. The data shall be examined for 100% of the environmental samples and shall include at a minimum, a complete review of holding times, sample preservation, blanks (laboratory, field, equipment, etc.), surrogate spikes, LCS, matrix spikes/matrix spike duplicates (MS/MSD), and field duplicates (FD), plus a review based on the laboratory narratives of GC/MS instrument performance, initial calibration, continuing calibration, internal standards, target compound identification, compound quantitation / reported limits and system performance. A review of the sample custody and sample receipt documentation for completeness and correctness will also be included along with an examination of the analytical results for inconsistencies and to check that the target analyte list is complete and the detection / quantitation limits are adequate. Exceedences will be identified based on the following criteria:

a. Laboratory Accuracy and Precision – the industry standard limits of 60-140 % recovery for organic analytes and ±40 relative percent difference (RPD).

b. Field Precision – Not applicable

The overall assessment of data shall include a discussion of QC exceedences or data outliers and shall identify any data that are not considered reliable based upon the review.

The following definitions provide explanations of the data validation qualifiers assigned to results for the data validation process:

- U - Blank affected; The analyte was not detected above 5x (10x for common contaminants) the level in an associated blank.

- UJ - Estimated data; The analyte was not detected above the reporting limit. However, the reporting limit is approximate due to exceedance of one or more QC requirements.

- J - Estimated data; The analyte was positively identified. The associated numerical value is approximate because it is below the reporting limit and/or due to exceedance of one or more QC requirements.

- N - Tentatively identified; The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".

- NJ - Tentatively identified, estimated data; The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration because the analyte was not included in the calibration and/or due to exceedance of one or more QC requirements.

- R - Rejected data; The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified.

- H - Bias in sample result is likely to be high

- L - Bias in sample result is likely to be low

NOTE: For multiple deficiencies, the validator applies the most severe flag (R > U > N/NJ > J/UJ).

6.0 REFERENCES

Teklab, Inc., 2007. Quality Assurance Manual. Revision 16. December 19.

United States Environmental Protection Agency (USEPA), 1987. A Compendium of Superfund Field Operations. USEPA document number EPA/540/P-87/001.

USEPA, 1999. Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review. October.

USEPA, 2001. EPA Requirements for Quality Assurance Project Plans (QA/R-5). Final. March. EPA/240/B-01/003. Office of Environmental Information.

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